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Principles of oral biopsy: part II

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Types of biopsy and indications

The four major types of biopsy routinely used in and around the oral cavity are cytology, aspiration biopsy, incisional biopsy, and excisional biopsy.

Oral cytology

Oral cytology is typically used as an adjunct to, not a substitute for, incisional or excisional biopsy procedures. Cytology allows examination of individual cells, but cannot provide the histologic features crucial for an accurate and definitive diagnosis. Cytology may be helpful when large areas of mucosal change are noted, or in areas with difficult surgical access. Lesions that lend themselves to cytologic examination may include; post-radiation changes, herpes, fungal infections, and pemphigus. In a cytologic examination, the lesion is scraped repeatedly and firmly with a moistened tongue depressor or cytology brush. The cells are then transferred to and smeared evenly on a glass slide. The slide is immediately immersed in a fixing solution or sprayed with a fixative, such as hairspray. The cells can be stained with any of a myriad of laboratory preparations and examined under the microscope.

Aspiration biopsy

Aspiration biopsy is the use of a needle and syringe to remove a sample of cells or contents of a lesion. The inability to withdraw fluid or air indicates that the lesion is probably solid. A radiolucent lesion in the jaw that yields straw-colored fluid on aspiration is most likely a cystic lesion. If purulent exudate (pus) is withdrawn, then an inflammatory or infectious process should be considered. The aspiration of blood might indicate a vascular malformation within the bone. Any intrabony radiolucent lesion should be aspirated before surgical intervention to rule out a vascular lesion. If the lesion is determined to be vascular in nature, the flow rate (high versus low) should be determined because uncontrollable hemorrhage can occur if incised. An 18-gauge needle is connected to a 5 or 10 ml syringe and is inserted into the center of the mass via a small hole in the bone. The tip of the needle may need to be positioned in multiple directions to locate a potential fluid center. The material withdrawn during aspiration biopsy can be submitted for pathologic examination and/or culturing.

Incisional biopsy

The intent of an incisional biopsy is to sample only a representative portion of the lesion. If the lesion is large or has many differing characteristics, more than one area may require sampling. Incisional biopsy is indicated whenever the lesion is difficult to excise because of its extensive size or in cases where appropriate excisional surgical management requires hospitalization or complicated wound management. A wedge shaped biopsy should be performed on a representative sample of the lesion. Necrotic tissue should be avoided because it does not aid in a diagnosis. The sample should be taken from the edge of the lesion to include surrounding normal tissue and be deep enough to include underlying changes of the surface lesion. Another tool that can be used for incisional or excisional purposes is a punch biopsy. The punch biopsy is especially well suited for diagnosis of oral manifestations of mucocutaneous and vesiculoulcerative diseases, such as lichen planus, pemphigus, etc. Available biopsy punches range in size from 2-10 mm in diameter. However, the smaller diameters should be avoided due to the risk of over-manipulating and crushing the tissue. The technique is easily performed with a low incidence of postsurgical morbidity. Suturing in regards to a punch biopsy procedure is usually not required as the surgical wounds heal by secondary intention. One disadvantage of using the biopsy punch is that it is difficult to obtain adequate, representative tissue deeper than the superficial lamina propria (1).

Excisional biopsy

The removal of the entire lesion at the time of the surgical diagnostic procedure is termed excisional biopsy. A perimeter of normal tissue (2-3 mm) surrounding the lesion is included with the specimen. Excisional biopsy should be performed on smaller lesions (less than 1 cm in diameter) that appear clinically benign. Pigmented and vascular lesions should be removed, if possible, in their entirety. This avoids seeding of the melanin producing tumor cells into the wound site or in the case of a hemangioma, allows the clinician to address the feeder vessels.

Tissue handling

The importance of proper tissue handling of biopsy specimens cannot be over-emphasized. The possibility of producing artifact is enhanced in oral biopsy because the tissue sample is often small. Multiple factors have been identified as causes of tissue artifact. Excessive use or force with tissue forceps or hemostats creates “V-shaped” voids in the specimen where it has been compressed, making it very difficult or impossible to obtain an accurate histological assessment. When handling the tissue specimen, special care should be undertaken to hold the specimen gently at the periphery of the sample. Injection of large amounts of anesthetic solution in the biopsy area, while providing hemostasis, can produce hemorrhage, which masks the normal cellular architecture. Infiltration of local anesthetic around the lesion is acceptable if the field is wide enough in relation to the lesion; however, injection directly into the lesion should be avoided. Use of electrocautery to excise the specimen remains a common complicating factor in determining an accurate microscopic diagnosis. Heat produced by these units alters both the epithelium and the underlying connective tissue by searing or obliterating the cellular detail. Small tissue biopsies to rule out malignancy are usually nondiagnostic if excised by electrocautery, as the presence of epithelial atypia is typically obscured. If electrocautery is to be used, the incision margin should be far enough away from the interface of the lesion to prevent thermal changes at that interface (2).

For optimal fixation, the amount of fixative should be approximately 20 times the volume of the specimen and the specimen should be placed in the fixative immediately following biopsy. The morphology of the specimen will be altered by the use of different fixatives. The recommended standard fixative is 10% neutral buffered formalin (3). Abbey and Sweeny (4) showed that water and saline are not acceptable tissue fixatives, because of severe alteration in the architecture of the epithelial cells. Alcohol causes acantholysis in the basal layer of the epithelium and disintegration of the fibrous connective tissue, and therefore, should also not be used as a tissue fixative (2). It is undesirable to freeze tissue prior to fixation or during transport. Since formalin freezes at 12º F, specimen and/or shipping containers should provide adequate insulation from extreme cold temperatures (2,5).

Completion of biopsy report form (SF515)

The biopsy report should include the name of the clinician, date the specimen was obtained, and pertinent characteristics of the specimen. The location/site, size, color, number, borders or margins, consistency, and relative radiodensity of the lesion are all important findings that should be included in the description of the specimen. If the lesion is evident on radiographs, it is very important to submit good quality radiographs with the specimen to aid in pathologic correlation and diagnosis. A 1996 study by Rumberg, Hollender, and Oda (6) showed that only 33 percent of panoramic radiographs, accompanying biopsy specimens were of acceptable quality. The clinical history (symptomology, growth rate, stimulating factors, duration of the lesion, etc.) can also assist the pathologist in a more definitive diagnosis. Since the pathologist is not able to see most patients clinically to evaluate the lesion, an accurate differential diagnosis and relevant clinical photographs and radiographs helps to portray what was seen in the clinical setting. The demographics of the patient can also offer insight since some diagnoses are more common in a specific age group, sex, or race.

What to do with your pathologists report

The key component between the submitting clinician and the pathologist is communication. The primary role of the contributing provider is to interpret the pathologist's report and select the appropriate course of action. Once the pathology report has been received by the provider, the decision must be made to institute no further treatment and follow the condition, remove the remaining portion of the lesion, or refer the patient to a specialist for further treatment. Occasionally, there is disagreement between the clinical impression and pathologist's diagnosis. If the pathology report does not agree with the clinical findings, another specimen may need to be submitted following discussions between the pathologist and clinician. The biopsy report may use terms that can be difficult to interpret. If there is any confusion or questions, the pathologist should be contacted for clarification. The treatment varies widely between benign, pre-malignant, and malignant neoplastic lesions. Pre-malignant and malignant neoplasms may need to be referred to an appropriate specialist as soon as possible, with appropriate definitive treatment provided for any benign lesions. Treatment for reactive or inflammatory lesions includes removal of the etiologic factor, if identified, and observation of the lesion, to ensure resolution. Regardless of the final diagnosis, the patient should always be informed of the results to resolve any feelings of uncertainty or anxiety. A copy of the biopsy report is then placed in the patients' dental record.

References

1. Lynch DP, Morris LF. The oral mucosal punch biopsy: indications and technique. J Am Dent Assoc 1990 Jul;121(1):145-9.
2. Margarone JE, Natiella JR, Vaughan CD. Artifacts in oral biopsy specimens. J Oral Maxillofac Surg 1985 Mar;43(3):163-72.
3. Sheehan DC, Hrapchak BB. Theory and practice of histotechnology. Saint Louis: C. V. Mosby Co.; 1973.
4. Abbey LM, Sweeney WT. Fixation artifacts in oral biopsy specimens. Va Dent J 1972 Dec;49(6):31-4.
5. Zegarelli DJ. Common problems in biopsy procedure. J Oral Surg 1978 Aug;36(8):644-7.
6. Rumberg H, Hollender L, Oda D. Assessing the quality of radiographs accompanying biopsy specimens. J Am Dent Assoc 1996 Mar;127(3):363-8.

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